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THE ORGANIZATION OF A BIOLOGY COURSE FOR INDIVIDUAL PROGRESS AT THEODORE HIGH SCHOOL--DESCRIPTIVE ANALYSIS

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SYSTEMS ANALYSIS AND COMPUTER SIMULATION TECHNIQUES WERE APPLIED IN DESCRIBING THE BIOLOGY COURSE AT THE THEODORE HIGH SCHOOL, THEODORE, ALABAMA, WHICH WAS SELECTED AS THE UNIT OF STUDY BECAUSE OF ITS ORGANIZATION OF COURSES FOR INDIVIDUAL PROGRESS. A DESCRIPTIVE ANALYSIS OF THE BIOLOGY COURSE WAS PRESENTED IN TERMS OF THE (1) INSTRUCTIONAL MEDIA, (2) PROCEDURES, (3) ROLES OF PERSONNEL INVOLVED IN THE COURSE, AND (4) SPACE USED. A STUDY GUIDE USED TO DIRECT EACH STUDENT THROUGH THE COURSE WAS ANOTHER INNOVATIVE FEATURE OF THE COURSE ORGANIZATION. THE STUDY GUIDE CONSISTED OF A DETAILED PLAN OF THE COURSE AND INSTRUCTIONS FOR STUDENTS. THE COURSE WAS DIVIDED INTO THREE LEVELS OF PERFORMANCE--(1) HIGH APTITUDE, (2) MEDIUM APTITUDE, AND (3) LOW APTITUDE. STUDENT ASSIGNMENT, PERFORMANCE, AND COURSE CHARACTERISTICS WERE DESCRIBED. RELATED REPORTS ARE ED 010 565 AND ED 010 567. (RS)

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The Organization of a Biology Course for Individual Progress at Theodore High School: Descriptive Analysis,

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ABSTRACT

This document is the second in a series reporting work done with Theodore High School in connection with the study New Solutions to Implementing Instructional Media Through Analysis and Simulation of School Organizations. This document describes the biology course at Theodore in terms of the instructional media, the procedures, the roles of the personnel involved in the course, and the space which is used.

* * * * * *

I. INTRODUCTION

In SDC Document TM-1493/101/00, Purpose and Strategy of the School Simulation Project, dated 19 December 1963, project personnel stated their intent to use system analysis and computer simulation techniques to investigate organizational modifications in education that support the use of instructional innovations. This 2 1/2 year study began with a nationwide survey of high schools to identify a select few that are demonstrating creative approaches in organizing their resources to use innovation. As a result of this survey, six specific schools, including Theodore High School in Theodore, Alabama, were chosen for intensive study.

TM-1493/110/00, dated 7 December 1965, described Theodore High School as a total organization. The school is outstanding among the nation's high schools with regard to the number and variety of courses that are operating on an individual progress basis. In these courses, students work independently, progressing through the materials and exercises that define the content of the course.

The biology course at Theodore was selected for intensive study because it is illustrative of the way that a course can be organized for individual progress. Two major innovations are represented by this course. One is the particular approach to organization, evident in the procedures, personnel roles, use of media, etc., that characterize the course. The other is in the use of a study guide to direct each student through the course. A detailed descriptive analysis of the course is presented below.

II. TECHNICAL DISCUSSION

A. GENERAL DESCRIPTION

The biology course at Theodore High School has a current enrollment of 155 students. The students are distributed into five sections, each meeting during a 50-minute period. Each student is assigned to one of three levels based on his expected performance in the course. Level refers to the course plan which a given student is expected to follow. There is a plan for high-aptitude students called Level I, a plan for medium-aptitute students called Level II, and a plan for low-aptitude students called Level III. Level III students are grouped for instruction so that they meet together during one period each day. This is referred to as the basic course. Because this course is not individualized, it will receive attention in this discussion only as it interfaces with the continuous progress course. The remaining four sections contain mixtures of students from Levels I and II and are organized to accommodate the continuous progress of students on an individual basis. Level II students are expected to cover six units of study on an individual progress basis during the two semesters. This level is designed for the main bulk of students. Level I is for those students with high aptitude for biology and consists of the same work covered by Level II students plus a seventh unit of study.

The curriculum of the continuous progress biology course articulates with the ninth-grade science course in that the last unit of science is an introduction to biology. Since the ninth-grade course is also individualized, it is anticipated that approximately 15 students will complete this course and begin biology before the end of the 1964-65 school year. The chemistry course at Theodore High School is not individualized. Those students who complete the continuous progress biology course early are expected to spend their free time in working on their remaining courses or in tutoring slower students.

Of the 159 students who began the course in the fall of 1964, as of the end of the first semester, 17 had dropped or withdrawn from the course due to transfer from the school, failure in the course, lack of interest, etc. On the other hand, seven students were admitted to the course, some to complete incompleted work from the previous year, and others as a result of having completed the ninth-grade science course.

Students whose performance is markedly different from that expected at the level to which they are assigned may be changed to a more appropriate level. Mobility from one level of the course to another, however, is not particularly evident. During the first semester, seven students moved from Level II to Level III. By comparison, only one student moved from III to II and one from Level II to I.

As of the end of the first semester, students were assigned to levels and sections as follows: the section meeting during the second period had a total of 29 students, two working on Level I and 27 on Level II. The 33 students meeting during period three were all assigned to Level II. The nonindividualized group of 26 Level III students met during the fourth period. The fifth period section of 37 students were divided so that two students were on Level I and 35 students were on Level II. The sixth period section of 30 students had one Level I student and 29 Level II students. Table 1 summarized the assignment of students by level and section.

Table 1. Assignment of Students by Level and Section

	Period (Section)				
	2	3	4	5	6
Level I				2	1
Level II	27	33		35	29
Level III			26		

B. DESCRIPTION OF INSTRUCTIONAL MEDIA AND PROCEDURES FOR USE

Individual progress in the regular (Levels I and II) biology course at Theodore is possible through the medium of a detailed study guide and procedures associated with its use. The following sections describe the Study Guide and the way it is used:

1. Study Guide. The biology course Study Guide contains both a detailed plan of the course and a set of instructions for students. It tells them what they must do to progress in the course. The guide consists of three sections: a preface; the guide proper; and appended schedules and materials.

The preface contains information to orient students to the course--much the sort of instruction which a teacher delivers as a lecture on the first day of a course. This section contains statements of over-all course objectives,

classroom and laboratory regulations and procedures, information on course materials, details of the grading system, and requirements for research papers and laboratory reports.

The main body of the guide is a detailed plan of assignments for students, arranged sequentially. The basic modules of the course plan correspond to chapters in the Biological Sciences Curriculum Study text, Biological Science: An Inquiry Into Life.* There are 41 of these chapters organized into seven units. The units are numbered I through VII and each represents a major topic of the contents of the total course.

Each unit described in the guide begins with a statement of the general objectives for that topic and ends with a list of requirements the student must meet in order to complete the unit. The number of chapters per unit varies, depending on the importance of the topic as related to the total course. Every unit ends with a test of student achievement, called a mastery test, hence student progress is measured by the units completed.

The chapter-oriented divisions of the course define the actual activities required of students. Each chapter is described in the guide by two headings. One lists the specific objectives to be achieved and the other is a checklist of the activities for accomplishing them. The basic presumptions for using the study guide are that all students can achieve the objectives of each chapter by performing the required activities and that completion of all chapters in a unit meets the objectives of that unit.

An average student working from the study guide completes a chapter in about a week's time, depending, of course, on his individual speed of work. Since most units include about four chapters, a student can expect to take a mastery test about once a month. Some units, however, contain more than four chapters and these larger units have been divided into parts so that tests can still come every four or so weeks. Table 2 shows the relationships among units, parts, and chapters in a synopsis of the course plan as outlined by the study guide.

2. Course Procedures. The following section describes the procedures associated with the biology course at Theodore High School.

a. Selection of Course by Student

In the spring of each year all Theodore students select a new program of courses for the remainder of their school career. Each student proposes his

*Harcourt, Brace & World, Inc., New York, 1963.

Table 2. Synopsis of Biology Course Plan

Unit No.	Part	Required?	Time Requirements	Chapters
I	A	Yes		1, 2, 3, 4
	B	Yes	End of First Qtr	5, 6, 7, 8
II		Yes		9, 10, 11
III	A	Yes		12, 13, 14
	B	Yes	End of Second Qtr	15, 16, 17
IV	A	Yes		18, 19, 20, 21
	B	Yes		22, 23, 24, 25
	C	Yes	End of Third Qtr	26, 27, 28, 29
V		Yes		30, 31, 32, 33
VI		Yes	End of Fourth Qtr	34, 35, 36, 37, 38
VII		Yes	Required of Level I	39, 40, 41

new educational plan as a result of information given in group counseling. He makes his selection from a listing of required and elective courses published by the school. The student's new plan is placed by him on a form which must be subsequently approved by his counselor and his parents. Following approval, the student transcribes his plan onto a key-sort card which is then used to produce a master schedule during the summer months.

Occasionally there are students who complete ninth-grade science and wish to begin biology during the school year--not waiting for the next fall. A student in this category completes a Change of Schedule action which must be approved by a counselor, the student's parent, the losing instructor, and the receiving instructor.

b. Approval of Students' Educational Plan

The approval of a student's educational plan by his counselor is equivalent to the instructor's approval. When a counselor has questions about the appropriateness of a course for a particular student, he confers with the instructor and they reach a joint decision.

c. Assignment of Student to Level

Before the course begins, the instructor assigns students to levels. Sources of information on which he bases his judgment are: (1) performance in previous science courses, (2) California Achievement Test scores in reading, and (3) to some extent the student's expressed wishes to attempt a certain level of work. The latter situation is usually one where a student believes he can succeed at a higher level than his record indicates.

Following each unit mastery test, the appropriateness of each students' course plan (level), is reviewed by the instructor. If he decides that the student is working against a plan that is too advanced, the student's level is adjusted downward and he begins working against the new plan. If, on the other hand, the student appears to have the potentiality for success against a higher level plan, he is moved to that level.

d. Use of Biology Learning Resource Center

The Biology Learning Resource Center (LRC) is an area containing individual student desks arranged in rows. There are enough desks so that the largest section can be seated simultaneously. Students use the LRC to work individually on chapters of the course when they are not scheduled for group discussion, library, testing, laboratory or work in the greenhouse. Each student is assigned a space in the LRC for his use during his regularly scheduled period.

Students working in the LRC are permitted limited movement to obtain resource materials from the shelves, to schedule future activities, and to get study help from the instructor or teacher assistant. Socializing with fellow students is expressly forbidden.

e. Beginning a Course Unit

At the beginning of the course or after successful completion of a unit, students start a new unit of instruction. The first step is to consult the study guide to become familiar with the objectives and the activities prescribed for meeting the objectives for the first chapter in the unit. The student then accomplishes the activities which always include the production of some written work and may include a group discussion. As he accomplishes the prescribed activities, he completes the appropriate checklist for that chapter as it appears in his study guide. His written work is accumulated in a folder pending completion of the work for the whole unit.

f. Ending a Course Unit

When a student has completed all the activities prescribed for all of the chapters in a unit, he is ready to complete the unit. He meets with the instructor to submit his folder and to review its contents for completeness. In the ensuing oral review of the materials, the instructor assesses the student's readiness to attempt the unit mastery test. Upon receiving the instructor's approval, the student is eligible to schedule himself for testing.

g. Approval for Written Assignments

As mentioned previously, each chapter carries a requirement for the student to produce some written work. Five different kinds of written work are identified in the study guide and the requirements for a given chapter may include production of some or all of each kind. The possibilities are:

(1) Guide questions and problems. This item appears at the end of each chapter in the text and is presumed to test the student's understanding of the textual material. The student may be required to produce written answers to these questions for placement in his folder.

(2) Laboratory exercise report. This item is discussed in detail in Section k, below.

(3) Group discussion report. This item is described in Section l, below.

(4) Written work in lieu of discussion report. In the event that there is not a sufficient number of students to form a group to discuss a topic, as may be required in the study guide, a student may be directed by the instructor to produce some written work such as an outline or answers to questions.

(5) Research paper. Some chapters of the course require production of a library research paper on a specific topic. The study guide provides directions as to acceptable format.

When a student completes an item of written work, he places it in his folder and deposits it in the instructor's "in" box for checking. Normally, the instructor will check work between one class meeting and the next, placing it in his "out" box. The student retrieves his folder and is responsible for acting on any suggestions which the instructor might make as he looks over the work.

h. Maintaining Student Folder

Each student is given a manila folder to hold his written work. In this, he accumulates all of his written work for a unit. When the instructor checks a piece of work, this action is noted on a checklist inside the cover of the folder. When the student has completed all work on a unit, the folder is reviewed as described in Section f, above. When the unit is mastered, all the information in the folder is removed by the instructor to prevent the passing of materials to other students.

i. Scheduling Work Areas

All students work in the LRC unless they have previously scheduled themselves for laboratory, library, greenhouse, discussion, or testing. A work area schedule book is maintained for each of the four sections in the regular course. Each page of the book represents one day for that section. Figure 1 shows a specimen of a page. The page is formatted so that the date, the period, and the laboratory assistant's name for that day can be entered as a heading. Under this are spaces corresponding to the five areas other than LRC, mentioned above. The number of spaces for names under each area corresponds to the maximum number of students that chan be handled in each area.

Students are encouraged to plan their activities and are required to schedule their non-LRC area work at least one day in advance. This scheduling is accomplished by having the student enter his name in the work area schedule (Figure 1) in the space corresponding to the particular area in which he wishes to work for the desired date.

Theodore High School
Biology Department
Work Area Sheet

DATE _____
PERIOD _____
ASSISTANT _____

Area I

Exercise _____

1. _____
2. _____

Area 2

Exercise _____

1. _____
2. _____

Area 3

Exercise _____

1. _____
2. _____

Area 4

Exercise _____

1. _____
2. _____

Area 5

Exercise _____

1. _____
2. _____

Area 6

Exercise _____

1. _____
2. _____

Library

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Testing

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Discussion

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Greenhouse

1. _____ 4. _____
2. _____ 5. _____
3. _____ 6. _____

Figure 1. Biology Department Work Area Sheet

j. Testing

When a student completes the activities in a unit, he must demonstrate mastery by taking a test before he can go on to the next unit in the course. After reviewing his accumulated work with the instructor, and after securing approval to take the test, the student indicates the date in the work area schedule book when he wishes to be tested. Upon entering the classroom on the selected date, he seats himself in the testing area and receives a set of questions from the instructor. Normally, the student will be informed of his test grade at the next class meeting.

A score of 90 is judged as indicating successful mastery of the unit. If the student does not meet this criterion, he prepares himself on the unit and schedules a second, and, possibly a third, test. If he is not successful in three attempts, he moves on to the next unit of the course.*

k. Conduct of Laboratory Exercises

Most chapters in the course require that the student conduct from one to three laboratory exercises. The study guide specifies the requirements for each chapter. The laboratory manual used in the course gives directions and background material for the exercises, as well as providing the student with a set of questions to demonstrate understanding of the exercise. Students who are to conduct an exercise must first read the description in the manual and give evidence that they comprehend the problem. This check is accomplished by completing a portion of the biology department Assignment Sheet form (Figure 2). The student enters his name, period, and date on this form along with the name of the exercise, a brief statement of its purpose, the materials and equipment required, and an outline of the procedures to be followed. The form must then be checked and initialed by the instructor before the student can proceed with the work. His next step is to schedule work space in the laboratory in the work area schedule book.

Upon completing the laboratory work, the student fills in the "results" and "summary" portions of the form and answers the exercise questions. The completed form must be submitted to the instructor for his approval on the day that the work is completed. This procedure minimizes the student's opportunity to plagiarize the work of others.

*On April 1, 1965, this procedure was changed to permit students to choose whether to repeat the test (if it was failed) or to move on to the next unit.

THEODORE HIGH SCHOOL
BIOLOGY DEPARTMENT
ASSIGNMENT SHEET

NAME: PERIOD: DATE:

NAME OF EXERCISE:

PURPOSE OF EXERCISE:

MATERIALS AND EQUIPMENT:

PROCEDURE:

RESULTS:

SUMMARY:

Note: Answer exercise questions on back. Approved_____
Instructor's signature should be obtained the day the lab work is done.

Figure 2. Biology Department Assignment Sheet

l. Forming Discussion Groups

A number of chapters in the course require that students participate in group discussions covering specific topics. Upon reaching a point in his progress which requires that he engage in a specific discussion, the student schedules himself for this activity by placing his name on the Work Area Schedule for a selected date under the "Discussion" heading. On the selected date he goes to the discussion area of the classroom to join with others who have expressed a similar desire.

After the discussion, the student completes a Group Discussion Report form (Figure 3) and places it in his folder. On this form he supplies his name, the name of the group chairman, who is selected by members of the group, the date, the topic, and a list of the group participants. He then summarizes the topic discussed and notes what other subjects were included. Finally he is asked to evaluate the session by choosing one of five qualitative statements.

m. Daily Change of Schedule

Students may absent themselves from their regular biology section by two procedures. Those desiring to schedule themselves into the library for research place their names on the Work Area Schedule under the "Library" heading. The instructor then reserves a corresponding number of places in the library on the Library Reservation form maintained in the school office. This form is arranged by period, and the instructor lists his name under the appropriate period along with the number of spaces he requires.

A second procedure is used when a student wishes to attend a class other than biology. Using a Schedule Change Request form, the student first gets approval from the biology instructor to be absent for a specified period and date. The student then gets approval on the bottom half of the form from the receiving teacher who collects and transmits the form back to the biology instructor.

A student may also reverse this procedure, and attend biology for an extra period. Using the same form, he gets approval from the instructor in the class he desires to miss and final approval from the biology instructor.

n. Assigning Laboratory Assistants

One student in each of the four sections of the regular biology course serves that class as laboratory assistant (LA) each day. This job rotates on a daily basis among all members in a section. The individual's name is entered on the Work Area Schedule in the appropriate space by the teacher assistant.

THEODORE HIGH SCHOOL
Biology Department
Group Discussion Report

Date_____
Chairman_____
Topic_____
_____
Your Name_____

Group Members
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Give a brief summary of the topic discussed:

What other subjects came up?

Check any of the following on your discussion:

_____ Waste of time
_____ Strayed from topic
_____ Members not prepared
_____ Good discussion
_____ Excellent discussion

Figure 3. Biology Department Group Discussion Report

o. Assigning Teacher Assistants

Each of the four sections of the continuous progress biology course is authorized to have a teacher assistant. He is selected by the instructor from volunteers on the basis of his interest in science, his previous successful completion of the biology course, and his desire to assist other students.

C. PERSONNEL ROLES ASSOCIATED WITH BIOLOGY COURSE

The description of roles in this section is limited to those activities directly associated with the course being studied. The instructor, for example, attends general faculty meetings after school and is chairman of the science department; students attend classes in other subjects; and counselors engage in many activities not specifically related to biology. The roles discussed below are defined with respect to the activities which directly support the biology course and are categorized by major functions.

1. Instructor

a. Organizing and Planning Activities:

(1) Prepares and revises course study guide.

(2) Prepares and revises procedures for course operation.

(3) Prepares and revises mastery tests.

(4) Selects teacher assistants and defines their jobs.

b. Maintaining Student Activities

Circulates in classroom and laboratory to sense a need for individual attention. Observable behavior is moving about or standing.

c. Controlling Student Progress:

(1) Examines student work to detect need for consultation to identify problems.

(2) Holds consultations when the student or he so requests, to review progress, clarify objectives, and recommend learning experiences. These consultations may involve both the parents and/or the counselor.

d. Administrative Activities:

(1) Takes corrective action to maintain optimal conditions of safety, cleanliness, quiet, and comfort in the classroom.

(2) Administers tests.

(3) Maintains attendance record.

(4) Assigns quarter, semester, and final grades.

(5) Maintains records of student progress and grades.

(6) Approves or disapproves student requests for "Daily Schedule Change."

(7) Assigns students to course level.

(8) Confers with counselors, other teachers, or individual students about appropriateness of biology course for border-line cases.

(9) Reviews schedule changes involving loss or gain of students to course.

(10) Requisitions space in library.

(11) Initiates requests to parents for conferences.

(12) Reviews space requirements and initiates requests for modifications.

(13) Reviews requirements for equipment, supplies, and materials, initiating requests for replacements and for modifications of inventory.

(14) Supervises teacher assistants and laboratory assistants in their jobs.

2. Counselor

a. Educational Planning:

(1) Reviews current and past performance of student in science courses; reviews post-high school goals; makes recommendations about appropriateness of biology course to student's achievement and goals.

(2) Initiates discussions of border-line cases with biology instructor.

b. Data Collection and Dissemination:

(1) Administers California Achievement Tests and California Test of Mental Maturity to all eighth and eleventh-grade students each year.

(2) Makes achievement scores known to each student and to all teachers for all students.

(3) Maintains records of student I.Q. scores on both verbal and performance scales and supplies records to all teachers for all students.

c. Consults with student at the student's, instructor's, or his own request to review performance, define problems, and select courses of action. May involve instructor and/or parent.

3. Teacher Assistant

(a) Circulates in classroom, stockroom, and laboratory to assist students, to monitor misuse of equipment and to control student conduct. Observable behavior is moving, standing, or sitting.

(b) Answers student's questions to clarify Study Guide or Laboratory Manual.

(c) Demonstrates equipment.

(d) Obtains laboratory supplies and equipment from stockroom.

(e) Prepares laboratory materials.

(f) Cleans or "straightens-up" classroom, laboratory or stock-room.

(g) Takes attendance.

(h) Maintains Work Area Schedules book--assigns laboratory assistant.

(i) Supervises laboratory assistant.

(j) Assumes primary responsibility for the classroom environment with regard to safety, order, and comfort, when instructor is temporarily absent.

(k) Confers with instructor about students or operation of course.

4. Laboratory Assistant

(a) Obtains laboratory supplies and equipment from stockroom at students' requests.

(b) Cleans used glassware and apparatus.

(c) Conducts final check on laboratory area at end of period, leaving the area clean and orderly for the next section.

D. SPACE UTILIZATION

The biology course at Theodore uses a complex of three rooms connected in a series. One large classroom is adjoined by the laboratory, which in turn is joined to a combined supply room and office for the instructor. The three rooms are all of equal width, bounded on one side by a corridor and on the other by an exterior wall of the school. Figure 4 shows a diagram of the rooms.

The large classroom serves three major functions. About one-third of the space is occupied by desks comprising the LRC. A long table for taking tests extends along one wall. The third function conducted in this room, small-group discussions, takes place in one corner of the room. The main entrance to the three-room complex is in the southeast corner of the large room.

The LRC area is occupied by five rows of student desks which face the north side of the large room. There is a large laboratory table and a single desk at the front of this area. Since there are seven student desks in each row, the LRC can accommodate 35 students. The single desk at the head of the LRC serves as a communications center for the class. Students place their folders containing completed work in a box on this desk and retrieve it here the next day. The Work Area Schedule book, the attendance rolls, daily Change of Schedule forms, and hall passes for temporarily leaving the biology complex are maintained on this desk.

The testing area has space for six students to sit side-by-side at a long table. The backs of these students are toward the LRC area and they face a row of windows. Care is exercised by the instructor to see that students sitting next to one another in the test area use different tests.

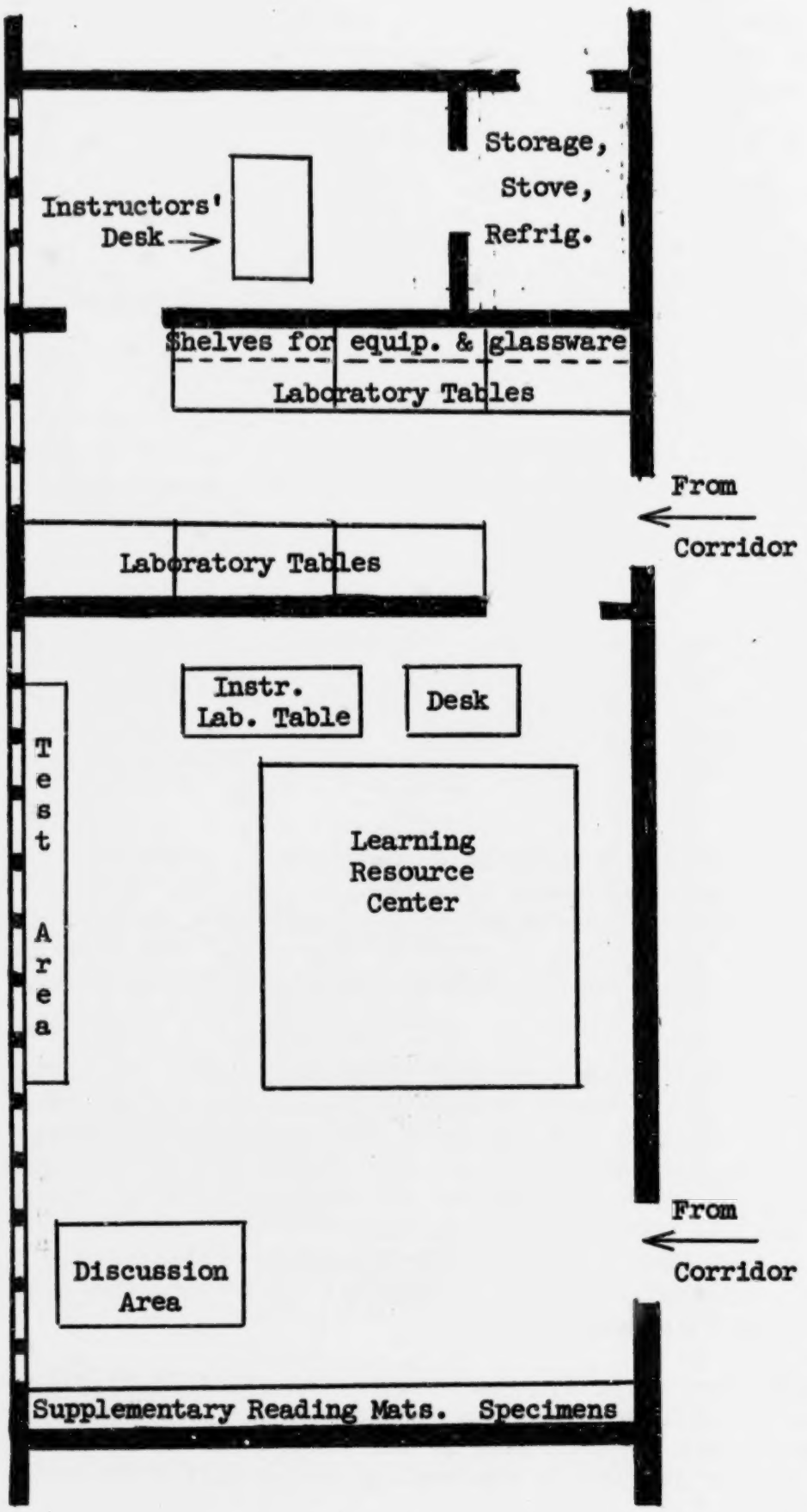

Figure 4. Diagram of Space Allocated to Course Functions

The discussion area contains a table with six chairs arranged about it. This area is 10 to 12 feet from the testing area and the LRC. Supplementary reading materials for the course are immediately adjacent.

The laboratory is accessible by a door at the front of the large classroom. There are six tables in the laboratory, each sufficiently large to accommodate two students. Thus, 12 students can use the laboratory simultaneously.

The combined supply room and instructor's office is connected to the laboratory by a doorway which can be partially shut-off by a half-door. Students can obtain supplies at this doorway. Only the instructor, teacher assistant, and laboratory assistant are normally permitted in this room during classes.